Pandemic Decision Analysis Center (PanDAC):
A Health Care Surge Model for Planning and Preparedness

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November 14, 2008
Objective and Topics

- **Objective:** To present prototype analysis tool for health care system planning, response and policies in event of a pandemic influenza

- **Topics:**
  - PanDAC capabilities and application
  - Demonstration
  - Example analysis questions and results
Role Play Introduction
Sandia uses simulation-driven analysis and exercises to inform national and regional response planning, and S&T investment.

PanDAC combines regional systems modeling and analysis capability (Sandia) with health care system domain expertise (Davis, Cornell).
PanDAC is an entity-level regional model

- End-user plays through a pandemic influenza scenario; selected decisions impact scenario outcomes
- Models:
  - Geographical region: Sacramento and Yolo county (currently)
  - Moving population: 1.4 million people
  - Population behavior: seek care, movement
  - Disease
  - Health care resources: hospital beds and staff, medical equipment, medication
  - Decisions: public health officials, hospital managers, responders
- Can examine health care system-level behavior as well as individual entity (hospitals, individuals) behavior
  - Provides insight on local causes of system-level behavior
- Parameters are configurable; models can be substituted
  - Assumptions can be tested and revised
  - Robustness of conclusions can be examined

Goal: to provide policy and planning guidance to health care policy-makers, public health officials, individual hospitals
Example Policy and Impact Questions

Public Health Officials and Policy-Makers
• What are impacts of interventions: social distancing, prophylaxis campaign?
• How should hospital bed space be managed across the region?
• Should triage be done within individual hospitals, or through a centralized system across regional hospitals?

Hospital Managers
• What patient loads should individual hospitals expect to see?
• What are the optimal trigger points for altering operating conditions from normal to surge?
• What is the impact of hospital staff attrition?
• What medical supplies are needed in what quantity?
PanDAC Demo
Example Policy and Impact Questions

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Summary Findings for Example Scenario

- Can reduce # dead and # affected by:
  - Preventing contagion through social distancing and prophylaxis campaigns
  - Providing effective, efficient health care services

- Prevention is the most impactful, through long-term social distancing (sequestering people in homes); even if compliance rates are low
  - If measures are short-term, second wave of infection overwhelms
  - Preventing spread of infection reduces compounding burdens downstream
  - Downstream treatment capacity is limited, so even large increases have less impact than prevention measures

- Hospital workers must be given prophylaxis before they go to work
  - Prophylaxis to hospital workers has more of an impact than to the general public because of their high rate of contact with infected patients
  - Even if sequester is short-term, if hospital workers are given prophylaxis for a long enough time, the pandemic can be prevented??

- Prophylaxis campaign and short-term social distancing buys time (delays infection peak), providing more time to ramp up surge operations

- Timing matters:
  - Trigger sequester before the pandemic begins
  - Trigger surge operations when ICU bed capacities have been reached
PanDAC results show impact of alternative decisions and scenario conditions

<table>
<thead>
<tr>
<th>Run</th>
<th>Response Measures</th>
<th>Recovered</th>
<th>Dead</th>
<th>Day of Infection Peak</th>
<th>Medication needed (# pills)</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO ACTIONS TAKEN</td>
<td>921,000</td>
<td>25,100</td>
<td>79</td>
<td>2 million</td>
<td>946,000/1.4 million affected</td>
</tr>
<tr>
<td>2</td>
<td>LONG-TERM SEQUESTER: Don't go to work for 1 month; Sequester 1 month (50% compliance), Px 10 days, Hospital Staff Px</td>
<td>96</td>
<td>8</td>
<td>7</td>
<td>Hospitals: 970; PODS: &gt;10 million</td>
<td>1 month sequester is effective, but can you control population movement for this long?</td>
</tr>
<tr>
<td>3</td>
<td>SHORT-TERM SEQUESTER: Don't go to work for 1 month; Sequester 1 week (50% compliance), Px 10 days, Hospital Staff Px</td>
<td>921,000</td>
<td>25,200</td>
<td>154</td>
<td>Hospitals: 2 million; PODS: &gt;10 million</td>
<td>If don't sequester long enough, until all infecteds past contagion phase, infection curve eventually grows again. It buys time to surge.</td>
</tr>
<tr>
<td>4</td>
<td>SHORT-TERM SEQUESTER + LONG-TERM PX (60 days)</td>
<td>88</td>
<td>8</td>
<td>7</td>
<td>Hospitals: 960; PODS: &gt;60 million</td>
<td>Effect of Px campaign is large-- but are these many pills available?</td>
</tr>
</tbody>
</table>
Prophylaxis campaign and social distancing delays onset of the pandemic, providing more time to ramp up for surge operations

Short-term Sequester and Px:
Sequester 1 week (50% compliance), Px 10 days, Hospital Staff Px 60 days
For No Actions Taken scenario, hospital bed capacity is not reached until a month after the start of the scenario. Surge operations should begin then.
Path Forward

- PanDAC next steps
  - Add modeling capability for vaccination and supply chains
  - Extend geographic coverage of the model
- Discussion
  - Utilization of PanDAC
  - CA DPH access